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Hon. Reed E. Hundt, Chairman  
Federal Communications Commission  
1919 M. St.  
Washington DC 20554

FEDERAL COMMUNICATIONS COMMISSION  
OFFICE OF SECRETARY  
MM Docket 87-268

Dear Mr. Chairman:

A solution to the vexing problem of digital broadcasting standards will not be found by compromise between "TV interests" and "computer interests," since neither group adequately represents the public interest. A solution that is beneficial for all the stakeholders, including the viewing public (which will pay for the new system), can only come from an independent group of experts having no financial interest in the outcome. In particular, most of the specific concerns of the computer industry can be dealt with by certain modifications to the proposed Grand Alliance standard that would not injure any domestic interest. The opinions expressed herein are mine only; I am not being paid by any company involved in this matter.

#### The Current Situation

The discussion about the digital terrestrial broadcasting standard to be issued by the Commission in this Docket has taken an unfortunate turn. Many seem to regard the controversy as primarily an argument between the television and computer industries. "If we only could get them to compromise, then we could move on and start reaping the benefits of the new technology." What this view overlooks is that any new system will be paid for by the viewing public, which has been underrepresented in the otherwise quite open process that has been supervised by the Commission since its inception in 1987. Since the issues can hardly be put to a vote (we would not think of using a referendum to decide on the safety of new drugs -- a comparable issue) it is the Commission that has the responsibility for ensuring that its decisions are in the public interest.

The Commission has already made a number of public-interest decisions in this case. One is that there is likely to be considerable public benefit from digital broadcasting. The Commission has also recognized that, unlike NTSC, the new system is expected to be upgraded over time. For example, one expected upgrade is the migration to progressive scanning, which everyone agrees is very desirable eventually, and which interlace advocates claim is not feasible at present. The Commission has clearly stated that such upgrading is to be done in a nondisruptive manner. Presumably, "nondisruptive" means that the initially installed equipment, both professional and consumer, may continue to be used as the expected upgrading takes place.

It is to be expected that all the companies involved in this matter hope to profit from digital

broadcasting. It is also to be expected that each company will advocate a particular standard that it believes is in its own financial interest. All this is perfectly proper in our economic system. However, one has to believe in magic to think that a battle over the relative profitability of the two industries will surely lead to a system that maximizes the public benefit, especially in these days when so many companies have a short-term outlook. In addition, the battle is being fought in the style of a political campaign, using language that the public is already complaining about when used by politicians.

There is a paucity of literature dealing with just what kind of new TV system the country needs, and there are very few employees of any of the companies involved whose job it is to assess the future. My own opinion is that many of the most outspoken members of both groups are quite wrong about where their long-term interests lie. We all remember when the TV industry was almost unanimously in favor of NTSC compatibility in the new HDTV system. Likewise, we may recall that some computer companies once thought that closed systems would be more profitable than open systems. Evidently, in this field, it is possible for many people to be wrong at the same time. In the current situation, it is my belief that everyone will profit the most in the long term from a system that is attractive to all the stakeholders, including the public. Such a system would grow the most rapidly, and would confer the greatest benefits on all participants.

#### The Grand Alliance Proposal

There are several problems with the Grand Alliance proposal. One is that it does not provide for any migration path to improved quality, let alone one that is nondisruptive in the sense described above. Another is that it uses interlace, an outmoded technology that has no place in any new television system. I have discussed this matter extensively in my previous submissions to the FCC, and will not take space to deal with it here, except to restate my opinion that much of the advocacy for interlace is coming from companies that have made unwise investments in designing interlaced equipment that they would now like to sell. Such companies would gain a short-term benefit if interlace were used. In the long term, however, they also would benefit the most from the more rapid development that is likely to result from a better standard.

Another difficulty with the GA proposal is that every receiver must have a complete HDTV decoder, regardless of its screen size. This will make the phase-out of NTSC politically difficult, as the price of set-top decoders and of the cheapest receivers will be higher than if a less powerful decoder could be used. The benefits of moving to digital transmission depend on eventually turning off analog broadcasting; if this cannot be done, then the entire motivation for the change in standards becomes questionable.

Those pushing for adoption of the current GA proposal are not helping their case by insisting that all contrary opinions are "fallacies" and that those who hold these opinions are "confused" or even "hysterical." They also reduce their credibility by asserting that the decision belongs exclusively to the terrestrial broadcasters. (Actually, ABC and Fox favor progressive scan, so even the broadcasters are not unanimous in this regard.)

## Objections to the GA Proposal

Opposition to the Grand Alliance system is most noticeable from the computer industry, and in particular from the members of CICATS. (Although CICATS represents only a portion of the computer industry, I think it is accurate to say that nearly all computer interests oppose interlace and some other aspects of the GA proposal.) This is quite understandable, as the future of the computer industry hinges, at least to some extent, on the ubiquity of high-resolution motion video on computer screens. No other application has yet appeared that can absorb the higher and higher processing speed and the larger and larger memory capacity of each new generation of computers. This application is undeniably inhibited by interlace.

I do believe that the CICATS objections are somewhat overdrawn. Even if interlace is permitted, neither the American economy nor the computer industry is likely to go down the drain. However, it seems clear to me that a serious impediment to the rapid growth of digital broadcasting is presented by the many formats of the GA proposal, and in particular the interlaced formats.

The CICATS proposal for a layered approach is a good one. Contrary to what some TV interests have been stating, layered systems have been around for some time. My students and I, for example, have developed a 3-layer system that works very well. A 3-layer system has also been demonstrated in Europe. Demonstrations are hardly necessary, however. The operational characteristics of such systems are readily projected from current knowledge. A layered system inherently enables a path to nondisruptive improvement over time -- a path that is absent from the GA proposal. In addition, depending on the resolution of the base layer, the least expensive receivers can be considerably cheaper than the least expensive receivers for the GA system.

Another criticism that is legitimately made of the current views of the computer industry is that some spokesmen act as if the FCC process has been conducted in secret and they just found out about it. I have criticized the process myself, but it has been open for the most part, with the exception of the original organization of the Advisory Committee, which was unwisely conducted entirely outside of public view. (When I complained about this at the time, a message was passed down through informal channels requesting that I keep my peace and that the problem would be addressed. I did, but it was not. The public has never been properly represented.) The computer industry did, however, have access to the process; they simply got outvoted on such issues as interlace. How voting ever got into the process escapes me, since the attendees are self-appointed. (I had thought that consensus was to be the primary method of reaching decisions.) In addition, the vast majority of the participants were voting as directed by their employers or consulting clients, so that little real discussion was possible.

What the computer industry should have done was to spend the money to develop a system that would be good for everyone. It did not. However, we are dealing with economic and not moral issues here. We are trying to find a system that meets the needs of all those involved, not least the needs and wishes of the public which will pay for it. This cannot be done by forcing the two groups to compromise. That is exactly what was done to form the Grand Alliance. Many of the problems with the GA system, such as too many formats, have resulted from this shotgun wedding. Similar difficulties may be expected from forcing the TV and computer industries to come

up with a joint proposal.

Finally, we should note that the need for an all-progressive system exists in the TV industry just as much as it is needed in the computer industry. Transcoding is heavily used in TV and will be even more heavily used in the future as additional formats are added to current formats. It is very difficult to transcode from an interlaced format to any other format. After all these years, it is still impossible to convert between PAL and NTSC except with substantial loss of quality.

### A Way Out of the Impasse

In Part II of my Comments to the Fifth NPRM, submitted 10 July 1996, I proposed certain modifications to the Grand Alliance proposal that I believe would go far toward solving the present problem, namely, to find a system that would be attractive to all the stakeholders. In addition, I proposed a process by which this could be accomplished in a reasonable length of time. The events that have transpired since July 10 have increased my confidence that this is a good path. The last part of that filing was as follows:

#### "5. A Process for Modifying the Proposed Standard

It is evident from the foregoing that certain modifications to the proposed DTV standard would make it more attractive to a wider group of stakeholders and that such modification is feasible without injuring any domestic interest. A procedure is required for deciding on the appropriate changes so as to meet the Commission's objectives and, at the same time, retaining the enthusiasm of broadcasters and equipment manufacturers.

The Advisory Committee, in most respects, has served the Inquiry well under the able leadership of Richard E. Wiley. Its main limitation is that it is composed, for the most part, of representatives of companies with a financial interest in the outcome. The public interest has not been sufficiently represented. Now that there is a fundamental disagreement between the TV industry and the computer industry over certain aspects of the standard, ACATS is no longer a suitable venue for making the final decisions. A small panel, appointed by the Commission, and composed exclusively of persons with no financial interest in the outcome, would seem appropriate. Business knowledge of both industries is required as well as technical expertise on the matters to be decided, not necessarily in the same individuals. Commission staff should be fully participating members of the panel, and decisions should be made by consensus. The terms of reference of the panel should be carefully formulated by the Commission, with the public interest at the top of the list.

#### "6. Conclusions and Recommendations

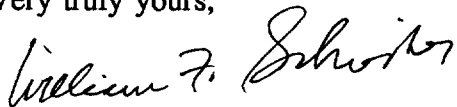
After an Inquiry that has lasted much longer than originally anticipated, the Advisory Committee has recommended a standard for digital television broadcasting. The proposed system is not the best that might be formulated. In particular, it will not achieve the maximum possible spectrum efficiency, it will require directional antennas at most receiver locations, and it has limited aspect ratio and interoperability. However, if the system operates as expected and if the benefits that are predicted actually materialize, it will represent a substantial improvement over NTSC in many respects, particularly the amount of spectrum that must be allocated for a given degree of program choice for viewers. I therefore recommend that the following actions be taken:

1. Issue a standard for the format of the transmitted signal that is substantially in accordance with the proposal.
2. Eliminate from the standard all formats that do not use progressive-scan transmission and square pixels.

3. Permit any spatial resolution in multiples of 144x256 for the 16x9 aspect ratio and spatial dimensions of arbitrary multiples of 16 for other aspect ratios, both up to some reasonable limit.
4. Permit any frame rate in multiples of 12 frames/sec, up to some reasonable limit.
5. Direct that system improvements be compatible with receivers suitable for the initial system or else operate by transmitting an enhancement signal (or signals) in addition to the signal directed to the initial receivers.
6. Appoint a panel of experts having no financial interest in the DTV standards situation, and request recommendations and comments on the following points within a 6-month period:
  - a. Possible simplification of the standard.
  - b. A minimum-regulation strategy for both the transmitted signal and for receivers to ensure that initial equipment and receivers may continue to be used as the system is upgraded over time.
  - c. The feasibility of Recommendations 3 and 4, and the technical details of Recommendation 5."

Too much time and too much effort have been expended on the development of an entirely new television broadcasting system, and too much public benefit is expected to let this process fade away in a fruitless argument among some of the interested parties. It is not necessary to start all over; almost all of the results of this lengthy process are entirely satisfactory. I am highly confident that, under the leadership of the Commission, some modifications to the Grand Alliance system can be devised that will result in a system that is beneficial to all the stakeholders. The Commission has done an excellent job in getting to this point. Now is the time for the extra effort that is needed to finish the work and to usher in a new era in television broadcasting.

Very truly yours,



Cc:

Commr. James H. Quello  
Commr. Rachelle B. Chong  
Commr. Susan Ness  
Hon. Edward J. Markey  
Mr. Richard E. Wiley  
Mr. Larry Irving  
Dr. Robert Pepper, FCC  
Other interested parties